



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/542,123	12/09/2005	Vladimir Pavlovich Popov	U 015850-2	8400
140	7590	06/21/2006	EXAMINER	
LADAS & PARRY 26 WEST 61ST STREET NEW YORK, NY 10023			JEFFERSON, QUOVAUNDA	
			ART UNIT	PAPER NUMBER
			2823	

DATE MAILED: 06/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/542,123	POPOV ET AL.	
	Examiner	Art Unit	
	Quovaunda Jefferson	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 December 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>December 2005</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

A substitute specification in proper idiomatic English and in compliance with 37 CFR 1.52(a) and (b) is required. The substitute specification filed must be accompanied by a statement that it contains no new matter. An example is shown on page 2 in the last paragraph in the sentence "the second wafer thermal oxide has a thickness of $0.2\div 0.5\text{ }\mu\text{m}$ ". Instead, of the symbol " \div ", this symbol should be "-". **Note:** this is not inclusive of all the grammatical and idiomatic errors.

Claim Objections

The claims are generally narrative and indefinite, failing to conform with current U.S. practice. They appear to be a literal translation into English from a foreign document and are replete with grammatical and idiomatic errors.

The term "bound state" in claim 1 is a relative term, which renders the claim indefinite. The term "bound state" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Examiner is unsure

what the claim means in using the term "bound state" when referring to the implanted hydrogen. Examiner is unsure if this is meant to imply that the implanted hydrogen is remaining in the substrate and is not released into the atmosphere during the drying or annealing phase or could this mean another phenomena.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3, 5, 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chan, US Patent 6,274,459 in view of Okuchi et al, US Patent 6,286,524.

Regarding claim 1, Chan teaches a method for producing a silicon-on-insulator structure including hydrogen implantation in silicon wafer (column 6, lines 57-61 and column 7, lines 7-16 and figure 2), chemical treatment of silicon wafer and substrate (column 7, lines 54-59. Note: while Chan teaches this cleaning process is done by one wafer, it is well known in the art that the cleaning process can be performed on both the transferring and receiving substrates in order to remove contaminates), joining of silicon

wafer **2100** and substrate **2201** (figure 4), and splicing and splitting of wafer along the implanted layer (column 8, lines 24-32 and figures 4 and 5), characterized in that a drying, removing of the of physically adsorbed substances from the surfaces of the wafers after chemical treatment is carried out at the moderate temperatures at which the implanted hydrogen is staying in the in the bound state (column 7, lines 59-60. Note: Chan teaches that in hydrogen implantation into silicon has a critical diffusion temperature of 500°C, in which a temperature above this would cause the hydrogen to escape into the atmosphere. Therefore, in order to keep the hydrogen in the substrate, all processes performed before the separation phase would have to be lower than 500°C), and joining the wafer and substrate, their splicing and exfoliating hydrogen induced transferring along the implanted layer in the wafer (column 8, lines 24-32 and figures 4 and 5).

Chan fails to teach a drying is carried out in the low vacuum conditions and splicing and exfoliating hydrogen induced transferring along the implanted layer in the wafer in the same low vacuum conditions at the same or slightly higher moderate temperatures at which the implanted hydrogen is staying mostly in the bound state. Okuchi teaches a drying is carried out in the low vacuum conditions as part of a process that makes it possible to speed up the intended wafer drying process (column 12, lines 3-9).

It would be obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Okuchi with that of Chan because the low vacuum condition is part of a process that makes it possible to speed up the intended wafer drying process (column 12, lines 3-9).

Chan and Okuchi fail to teach splicing and exfoliating hydrogen induced transferring along the implanted layer in the wafer in the same low vacuum conditions at the same or slightly higher moderate temperatures at which the implanted hydrogen is staying mostly in the bound state. However, given the teaching of the references, it would have been obvious to determine the optimum thickness, temperature as well as condition of delivery of the layers involved See *In re Aller, Lacey, and Hall* (10 USPQ 23 3-237) "It is not inventive to discover optimum or workable ranges by routine experimentation. Note that the specification contains no disclosure of either the critical nature of the claimed ranges or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Regarding claim 3, Chan further teaches in that the hydrogen implantation is carried out with H_2^+ or H^+ ions with doses $(1.5-15) \times 10^{16} \text{ cm}^2$ and energies 20 to 200 keV, respectively (column 6, lines 26-31).

Regarding claim 5, Chan further teaches that a touch chemical-mechanical polishing (CMP) or thermal oxidation with following chemical etching in diluted hydrofluoric acid are carried out for removing of upper rough layer on the surface of exfoliated silicon film (column 9, lines 53-67).

Regarding claim 7, Chan further teaches that the substrate is a glass wafer (column 7, line 44), but fails to teach the substrate with the thickness about 500 μm . However, given the teaching of the references, it would have been obvious to determine the optimum thickness, temperature as well as condition of delivery of the layers involved See *In re Aller, Lacey, and Hall* (10 USPQ 23 3-237) "It is not inventive to discover optimum or workable ranges by routine experimentation. Note that the specification contains no disclosure of either the critical nature of the claimed ranges or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. *In re Woodruff*, 919 f.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Regarding claim 8, Chan further teaches that the substrate is a quartz wafer, but fails to teach the substrate with the thickness about 500 μm . However, given the teaching of the references, it would have been obvious to determine the optimum thickness, temperature as well as condition of delivery of the layers involved See *In re Aller, Lacey, and Hall* (10 USPQ 23 3-237) "It is not inventive to discover optimum or

workable ranges by routine experimentation. Note that the specification contains no disclosure of either the critical nature of the claimed ranges or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Regarding claim 9, Chan fails to teach the drying and splicing and exfoliating along the implanted layer at the temperatures 80 to 350°C with duration from 0.1 to 100 hours are carried out in the low vacuum conditions (10^1 to 10^4 Pa). However, given the teaching of the references, it would have been obvious to determine the optimum thickness, temperature as well as condition of delivery of the layers involved. See *In re Aller, Lacey, and Hall* (10 USPQ 23 3-237) "It is not inventive to discover optimum or workable ranges by routine experimentation. Note that the specification contains no disclosure of either the critical nature of the claimed ranges or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Claims 2 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chan in view of Okuchi as applied to claim 1 above, and further in view of Eklund et al, US Patent 5,077,228.

Regarding claim 2, Chan further teaches the method according to claims, characterized in that the hydrogen implantation was carried out through (column 6, line 6), but Chan and Okuchi fails to teach thermally grown oxide SiO_2 with the thickness 5 to 50 nm and following it is removed after implantation. Eklund teaches teach thermally grown oxide SiO_2 with the thickness 5 to 50 nm and following it is removed after implantation (column 3, lines 24-41 and column 4, lines 32-41) because the SiO_2 layer is a sacrificial layer, which is used is formed and removed to remove damage on the surfaces of the trench and provide a high quality surface for the formation of the gate oxide layer.

It would be obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Eklund with that of Chan and Okuchi because the SiO_2 layer is a sacrificial layer, which is used is formed and removed to remove damage on the surfaces of the trench and provide a high quality surface for the formation of the gate oxide layer (column 4, lines 32-41).

Regarding claim 6, Chan and Okuchi fail to teach that the thickness of thermally grown oxide SiO_2 with on the substrate is equal to 0.01 to 3 μm . Eklund teaches that the

thickness of thermally grown oxide SiO_2 with on the substrate is equal to 0.01 to 3 μ (column 3, lines 24-41 and column 4, lines 32-41) because the SiO_2 layer is a sacrificial layer, which is used is formed and removed to remove damage on the surfaces of the trench and provide a high quality surface for the formation of the gate oxide layer.

It would be obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Eklund with that of Chan and Okuchi because the SiO_2 layer is a sacrificial layer, which is used is formed and removed to remove damage on the surfaces of the trench and provide a high quality surface for the formation of the gate oxide layer (column 4, lines 32-41).

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chan in view of Okuchi as applied to claim 1 above, and further in view of Aga et al, US Patent 6,846,718. Chan fails to teach a thermal annealing is carried out at 1100° C during 0.5 to 1 hour after splitting. Aga teaches a thermal annealing is carried out after splitting as a means to flatten the delaminated surface (column 2, lines 1-7).

It would be obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Aga with that of Chan because the thermal annealing is

Art Unit: 2823

carried out after splitting as a means to flatten the delaminated surface (column 2, lines 1-7).

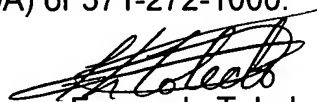
Chan and Aga fails to teach a thermal annealing is carried out at 1100° C during 0.5 to 1 hour after splitting. However, given the teaching of the references, it would have been obvious to determine the optimum thickness, temperature as well as condition of delivery of the layers involved See *In re Aller, Lacey, and Hall* (10 USPQ 23 3-237) "It is not inventive to discover optimum or workable ranges by routine experimentation. Note that the specification contains no disclosure of either the critical nature of the claimed ranges or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quovaunda Jefferson whose telephone number is 571-272-5051. The examiner can normally be reached on Monday through Friday, 8AM to 4:30PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Fernando Toledo
Patent Examiner
Art Unit 2823

qvj